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(71)出願人　000002185
ソニー株式会社
東京都品川区北品川６丁目７番35号
(72)発明者　松本　芳幸
東京都品川区北品川６丁目７番35号　ソニー株式会社内

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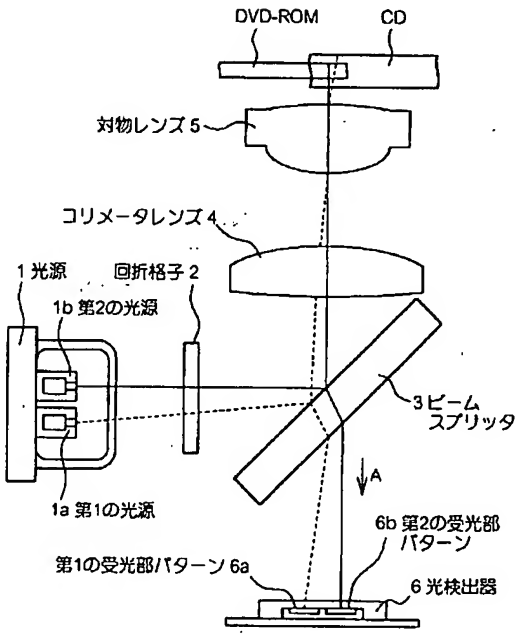
(54)【発明の名称】光学ピックアップ装置およびこれを具備する光記録再生装置

(57)【要約】
【課題】　種類の異なる光記録媒体に対して高品質の再生信号や記録信号を得るとともに、小型の光学ピックアップ装置および光記録再生装置の提供。
【解決手段】　波長の異なる複数の光源（第１，２の光源１ａ，１ｂ）と、複数の光源（第１，２の光源１ａ，１ｂ）から出射される各々の出射光ビームの、光記録媒体（ＣＤ又はＤＶＤ－ＲＯＭ）からの反射光ビームを個別に受光する複数の受光部パターン（第１，２の受光部パターン６ａ，６ｂ）を同一基板上に形成した光検出器６と、複数の光源（第１，２の光源１ａ，１ｂ）から光検出器６に至る光路を共有する光学系（回折格子２，ビームスプリッタ３，コリメータレンズ４，対物レンズ５）とを有する光学ピックアップ装置およびこれを具備する光記録再生装置を特徴とする。



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【特許請求の範囲】

【請求項１】　波長の異なる複数の光源と、
前記複数の光源から出射され、光記録媒体で反射される各々の戻り光を個別に受光する複数の受光部パターンを同一基板上に形成した光検出器と、
前記複数の光源から前記光検出器に至る光路を共有する光学系とを有することを特徴とする光学ピックアップ装置。

【請求項２】　前記複数の光源が、同一基板上に配設されていることを特徴とする請求項１に記載の光学ピックアップ装置。

【請求項３】　波長の異なる複数の光源と、
前記複数の光源から出射され、光記録媒体で反射される各々の戻り光を個別に受光する複数の受光部パターンを同一基板上に形成した光検出器と、
前記複数の光源から前記光検出器に至る光路を共有する光学系とを有する光学ピックアップ装置と、
前記光学系を構成する対物レンズを、少なくとも前記光記録媒体のトラッキング方向に制御駆動する制御駆動手段とを有することを特徴とする光記録再生装置。

【請求項４】　前記複数の光源が、同一基板上に配設されていることを特徴とする請求項３に記載の光記録再生装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は光学ピックアップ装置およびこれを具備する光記録再生装置に関し、さらに詳しくは、種類の異なる光記録媒体に対応する光学ピックアップ装置およびこれを具備する光記録再生装置に関する。

【０００２】

【従来の技術】光記録技術における高密度大容量化は近年大きく進展しており、たとえばＣＤ(Compact Disc)におけるピットサイズが０．８３μｍ程度であったのに対して、最近商品化されたＤＶＤ(Digital Video Disあるいは Digital Versatile Disc)ではピットサイズが０．４μｍ程度となっている。またトラックピッチについてみれば、ＣＤが１．６μｍであったのに対し、ＤＶＤは０．７４μｍと狭トラックピッチ化が行われている。光記録技術における記録密度は、対物レンズを介して収束する光スポットの径により決定され、この光スポット径は光源の波長と対物レンズのＮＡ(Numerical Aperture)とにより決定される。すなわち、より短波長の光源を用い、より高ＮＡの対物レンズを用いるほど、光スポットの小径化が図られるとともにより高密度大容量化を図ることが可能となる。

【０００３】ところで、ＣＤ－Ｒ（書き込み可能ＣＤ）の記録膜を構成する有機色素膜は、光源の波長７８５ｎｍ付近のみでＣＤと同等の７０％以上の反射率が得られるように設計されている。したがって、一個の７８５ｎｍの波長の光源を有する光学ピックアップ装置で、ＣＤの再生およびＣＤ－Ｒに記録再生を行うことは可能である。しかしながら一般的な光学ピックアップ装置は、特定の光記録媒体に対してそれぞれ一個ずつの最適なＮＡの対物レンズと最適な波長を出射する半導体レーザ等の光源とを有しており、他の種類の光記録媒体に対して情報を記録する、あるいは記録された情報を再生することは困難である。

【０００４】たとえば、ＤＶＤに対しては波長が６３５ｎｍあるいは６５０ｎｍである光源が必要であり、これらの波長の光源を用いて、たとえばＣＤ－Ｒの記録膜上に収束する光スポットの形成は可能であるが、この波長帯での反射率が悪く、十分な強度を有する反射光を得ることは困難である。すなわち、種類の異なる光記録媒体に対応する光学ピックアップ装置では、各々の光記録媒体に対応する波長の光を出射する複数の光源が必要であり、また、各々の光記録媒体に対応する受光部パターンを有する光検出器が必要である。この場合、とくに各々の光記録媒体に対応する受光部パターンの相対位置精度には高精度が要求され、望ましくは異なる波長を出射する複数の光源の相対位置精度にも高精度が要求されており、これらを満足するとともに小型の光学ピックアップ装置が求められていた。また、種類の異なる光記録媒体に対応する光学ピックアップ装置を具備し、小型且つ各々の光記録媒体に対して高品質の再生信号や記録信号を得ることが可能な光記録再生装置が求められていた。

【０００５】

【発明が解決しようとする課題】本発明の課題は、種類の異なる光記録媒体に対して高品質の再生信号や記録信号が得られるとともに、小型の光学ピックアップ装置およびこれを具備する光記録再生装置を提供することである。

【０００６】

【課題を解決するための手段】上記課題を解決するために、本発明の光学ピックアップ装置では、波長の異なる複数の光源と、複数の光源から出射され、光記録媒体で反射される各々の戻り光を個別に受光する複数の受光部パターンを同一基板上に形成した光検出器と、複数の光源から光検出器に至る光路を共有する光学系とを有することを特徴とする。

【０００７】本発明の光記録再生装置では、波長の異なる複数の光源と、複数の光源から出射され、光記録媒体で反射される各々の戻り光を個別に受光する複数の受光部パターンを同一基板上に形成した光検出器と、複数の光源から光検出器に至る光路を共有する光学系とを有する光学ピックアップ装置と、光学系を構成する対物レンズを、少なくとも光記録媒体のトラッキング方向に制御駆動する、たとえばリニアモータ等により構成された制御駆動手段とを有することを特徴とする。

【０００８】上記の光学ピックアップ装置および光記録

再生装置における望ましい実施態様は、波長の異なる複数の光源を同一基板上に配設したものである。

【０００９】上述した手段による作用について、以下に記す。複数の受光部パターンを同一基板上に形成することにより、各々の受光部パターンが高精度な相対位置精度を有する小型の光検出器の提供が可能となり、これを用いて種類の異なる光記録媒体に対応する小型の光学ピックアップ装置の提供が可能となる。そして、この光学ピックアップ装置を具備する光記録再生装置では、波長の異なる複数の光源から出射されて光記録媒体で反射される各々の戻り光を受光部パターンに高精度に導くことが可能となり、種類の異なる光記録媒体に対して高品質の再生信号や記録信号を得ることが可能であるとともに小型化を図ることが可能となる。

【００１０】

【発明の実施の形態】本発明は、ＣＤやＤＶＤ－ＲＯＭ等に代表される再生専用の光ディスク、追記および再生が行えるＤＶＤ－Ｒ、記録再生および消去が行えるＤＶＤ－ＲＡＭ、光磁気ディスク等により様々に組み合わされる種類の異なる光記録媒体に対応する光学ピックアップ装置およびこれを具備する光記録再生装置に適用することができる。なお、ここでいう光学ピックアップ装置および光記録再生装置は、再生のみを行う再生専用装置、記録のみを行う記録専用装置、記録と再生の両方を行うことのできる装置を含むものである。以下、本発明の実施の形態例について、図１～図８を参照して説明する。

【００１１】実施の形態例１

本実施の形態例は、図１の光学ピックアップ装置の概略構成図に示したように、異なる２種類の光記録媒体の一例としてＣＤとＤＶＤ－ＲＯＭとに対応する光学ピックアップ装置の事例であり、光源１は同一基板上に所定の間隔を有して配設された、ＣＤに対応する、たとえば波長７８５ｎｍの第１の光源１ａと、ＤＶＤ－ＲＯＭに対応する、たとえば波長６５５ｎｍの第２の光源１ｂとを同一パッケージ内に収納している。また、光検出器６は、図１におけるＡ方向から光検出器６をみた概略平面図である図２に示したように、同一基板上に所定の間隔を有して形成された、ＣＤに対応する第１の受光部パターン６ａとＤＶＤ－ＲＯＭに対応する第２の受光部パターン６ｂとを同一パッケージ内に収納している。

【００１２】まず、ＣＤを再生する場合について説明する。ＣＤに記録されている情報を再生する場合、第１の光源１ａからの出射光は回折格子２を透過する際、互いに進行方向の異なる三本の光束（０次光、＋１次光、－１次光）に分離され、透明な平行平板で構成されたビームスプリッタ３に入射する。ビームスプリッタ３で反射された０次光、＋１次光、－１次光はコリメータレンズ４に入射して何れも平行光に変換される。コリメータレンズ４を透過した０次光、＋１次光、－１次光は対物レンズ５を介して個別に収束され、この場合はＣＤの情報記録面に三つの光スポットを形成する。ＣＤの信号記録面で反射された０次光、＋１次光、－１次光の戻り光は、再び対物レンズ５、コリメータレンズ４、ビームスプリッタ３を透過し、光検出器６の第１の受光部パターン６ａに入射する。図２に示した事例において、フォーカシングエラー信号はＣＤの信号記録面で反射された０次光の戻り光を受光する４分割の受光部パターンＡ１，Ｂ１，Ｃ１，Ｄ１から得られる信号出力I_{A1}，I_{B1}，I_{C1}，I_{D1}により（（$I_{A1}+I_{C1}$）－（$I_{B1}+I_{D1}$））の演算に基づいて検出される。また、トラッキングエラー信号は－１次光の戻り光を受光する受光部パターンＥと＋１次光の戻り光を受光する受光部パターンＦから得られる信号出力I_E，I_Fにより（I_E-I_F）の演算に基づいて検出される。また、ＲＦ信号は（$I_{A1}+I_{B1}+I_{C1}+I_{D1}$）の演算に基づいて検出される。

【００１３】なお、このようにＣＤとＤＶＤ－ＲＯＭとの再生に共用される対物レンズ５は、一般的にＤＶＤ－ＲＯＭに対応する仕様の対物レンズ５が採用される。ＤＶＤ－ＲＯＭ仕様の対物レンズ５を用いてＣＤを再生すると、対物レンズ５の球面収差により受光領域以上に光スポットが拡大されるので、実効的な開口数ＮＡが小になるとともに実効収差も減少する。すなわち、ＣＤとＤＶＤ－ＲＯＭとにおける受光領域が分離されるので、適正な実効ＮＡになるようにＣＤ用の第１の受光部パターン６ａのパターン形状をきめれば、これによりＣＤを再生することが可能となる。

【００１４】つぎに、ＤＶＤ－ＲＯＭを再生する場合について説明する。ＤＶＤ－ＲＯＭに記録されている情報を再生する場合、第２の光源１ｂから出射光が出射される。以下、第２の光源１ｂからの出射光がＤＶＤ－ＲＯＭの信号記録面に達し、ＤＶＤ－ＲＯＭの信号記録面で反射された戻り光がビームスプリッタ３を透過するまでの過程は、上記したＣＤの場合と同様である。そして、ビームスプリッタ３を透過した戻り光は光検出器６の第２の受光部パターン６ｂに導かれる。図３は図２と同様に、図１におけるＡ方向から光検出器６をみた概略平面図である。図３に示した事例において、ＤＶＤ－ＲＯＭの信号記録面で反射された０次光の戻り光を受光する４分割の受光部パターンＡ２，Ｂ２，Ｃ２，Ｄ２から得られる信号出力I_{A2}，I_{B2}，I_{C2}，I_{D2}により、フォーカシングエラー信号は（（$I_{A2}+I_{C2}$）－（$I_{B2}+I_{D2}$））の演算に基づいて検出される。また、トラッキングエラー信号はＤＰＤ（Differential Phase Detection：位相差検出法）による（位相（$I_{A2}+I_{C2}$）－位相（$I_{B2}+I_{D2}$））の演算に基づいて検出される。また、ＲＦ信号は（$I_{A2}+I_{B2}+I_{C2}+I_{D2}$）の演算に基づいて検出される。すなわち、回折格子２により分離され、ＤＶＤ－ＲＯＭの信号記録面で反射された＋１次光および－１次光は無視する。

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【００１５】上記の図１では、光源１とビームスプリッタ３との間の光路中に回折格子２を配設した事例を示したが、図４に示した光学ピックアップ装置の概略構成図の様に、回折格子２を取り除きＣＤとＤＶＤ－ＲＯＭとを何れもＤＰＤ法によりトラッキングエラー信号を得る構成としても良い。この場合の光検出器６の第１，２の受光部パターン６ａ，６ｂは、図４におけるＢ方向から光検出器６をみた概略平面図である図５に示したように、何れも４分割の受光部パターン（ＣＤ用の第１の受光部パターン６ａはＡ１，Ｂ１，Ｃ１，Ｄ１、ＤＶＤ－ＲＯＭ用の第２の受光部パターン６ｂはＡ２，Ｂ２，Ｃ２，Ｄ２）となる。

【００１６】また、図６に示した光学ピックアップ装置の概略構成図の様に、光源１に構成される第１，２の光源１ａ，１ｂを同一の半導体基板に構成した、いわゆるマルチ発光光源としても良い。このように第１，２の光源１ａ，１ｂを同一の半導体基板に構成すれば、第１の光源１ａと第２の光源１ｂとの間隔を高精度で位置決めすることができる。すなわち、この光源１から出射し、光記録媒体で反射された戻り光を、光検出器６の第１の受光部パターン６ａあるいは第２の受光部パターン６ｂに高精度に導くことが可能となる。このように第１，２の光源１ａ，１ｂを同一の半導体基板に構成した光源１は、当然図１に示した事例にも適用することができる。

【００１７】実施の形態例２

本実施の形態例は、図７の光学ピックアップ装置の概略構成図に示したように、異なる２種類の光記録媒体の一例としてＣＤとＤＶＤ－ＲＯＭに対応する光学ピックアップ装置の事例であり、光源１は、ＣＤに対応する、たとえば波長７８５ｎｍの第１の光源１ａと、ＤＶＤ－ＲＯＭに対応する、たとえば波長６５５ｎｍの第２の光源１ｂとを別個に配設した事例である。なお、光検出器６は、図１におけるＡ方向から光検出器６をみた概略平面図である図２と同様、同一基板上に所定の間隔を有して形成された、ＣＤに対応する第１の受光部パターン６ａとＤＶＤ－ＲＯＭに対応する第２の受光部パターン６ｂとを同一パッケージ内に収納している。

【００１８】まず、ＣＤを再生する場合について説明する。ＣＤに記録されている情報を再生する場合、第１の光源１ａからの出射光は回折格子２を透過する際、互いに進行方向の異なる三本の光束（０次光、＋１次光、－１次光）に分離され、光源合成用ビームスプリッタ７で反射され、透明な平行平板で構成されたビームスプリッタ３に入射する。以下は、実施の形態例１において図１および図２を参照して説明と同様であり、重複する説明を省略する。

【００１９】つぎに、ＤＶＤ－ＲＯＭを再生する場合について説明する。ＤＶＤ－ＲＯＭに記録されている情報を再生する場合、第２の光源１ｂからの出射光は光源合成用ビームスプリッタ７を透過する。以下、実施の形態例１において図１および図３を参照した説明と同様であり、重複する説明を省略する。

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【００２０】本実施の形態例でも実施の形態例１と同様に、第１の光源１ａと光源合成用ビームスプリッタ７との間の光路中に配設された回折格子２を取り除き、ＣＤとＤＶＤ－ＲＯＭとを何れもＤＰＤ法によりトラッキングエラー信号を得る構成としても良い。この場合の光検出器６の第１，２の受光部パターン６ａ，６ｂは、実施の形態例１において参照した図５と同様に、何れも４分割の受光部パターン（ＣＤ用の第１の受光部パターン６ａはＡ１，Ｂ１，Ｃ１，Ｄ１、ＤＶＤ－ＲＯＭ用の第２の受光部パターン６ｂはＡ２，Ｂ２，Ｃ２，Ｄ２）となる。

【００２１】実施の形態例３

本実施の形態例では、上記した実施の形態例１，２に示した光学ピックアップ装置を具備する光記録再生装置の概略構成の一例について、概略ブロック図である図８を参照して説明する。本実施の形態例の光記録再生装置を構成するスピンドルモータ８には、ＣＤとＤＶＤ－ＲＯＭの何れもがチャッキング可能なチャッキング装置が構成されている。また、光学ピックアップ装置１０をトラッキング方向に移動するように、スレッドモータ９と図示を省略するガイド機構が構成されている。この場合、少なくとも光学ピックアップ装置１０を構成する対物レンズ５をトラッキング方向に移動可能な構成にし、対物レンズ５を除く他の光学部品を固定側に配設する構成としても良い。

【００２２】光記録再生装置全体のコントロールは、システムコントローラ１５からの指令に基づき、サーボプロセッサ／再生データ復調部１２を介して行われる。スピンドルモータ８にチャッキングされたＣＤあるいはＤＶＤ－ＲＯＭは、それぞれに対応する光源が選択されるとともにスレッドモータ９による送り速度等が選択され、光学ピックアップ装置１０による再生信号はＲＦＭＡＴＲＩＸアンプ１１に供給される。このＲＦＭＡＴＲＩＸアンプ１１においてフォーカシングエラー信号、トラッキングエラー信号、ＣＤあるいはＤＶＤ－ＲＯＭの何処を読み出しているかの位置情報等の検出とＲＦ信号から再生データの生成が行われ、増幅された信号がサーボプロセッサ／再生データ復調部１２に供給される。このサーボプロセッサ／再生データ復調部１２に構成される再生データ復調部はＣＤとＤＶＤ－ＲＯＭとを何れも復調可能に構成されている。

【００２３】このうちのフォーカシングエラー信号およびトラッキングエラー信号はフィルタリングされ、フォーカシング制御信号およびトラッキング制御信号としてサーボドライバ１３に供給される。サーボドライバ１３はフォーカシング制御信号によって光学ピックアップ装置１０を構成する、たとえば二軸アクチュエータのフォーカシングコイルを駆動し、トラッキング制御信号によ

って光学ピックアップ装置１０を構成する二軸アクチュエータのトラッキングコイルを駆動する。トラッキング制御信号の低域成分はサーボドライバ１３に供給され、スレッドモータ９を駆動する。これらによって、フォーカシングサーボ、トラッキングサーボおよびスレッドサーボのフィードバックサーボが行われる。

【００２４】ＣＤあるいはＤＶＤ－ＲＯＭの何処を読み出しているかの位置情報はサーボプロセッサ／再生データ復調部１２により処理され、スピンドル制御信号としてスピンドルモータドライバ１４に供給され、スピンドルモータ８はスピンドルモータ８にチャッキングされたＣＤあるいはＤＶＤ－ＲＯＭの再生されている位置に応じた所定の回転数に制御駆動され、ここから実際の再生が開始される。そして、サーボプロセッサ／再生データ復調部１２により処理されて復調された再生データが外部に供給される。

【００２５】上記の実施の形態例１，２に示した事例では、種類の異なる光記録媒体の一例として、２種類のＣＤとＤＶＤ－ＲＯＭに対応する光学ピックアップ装置を示し、実施の形態例３では実施の形態例１，２に示した事例の光学ピックアップ装置を具備する光記録再生装置を示したが、本発明はこれに限定されるものではない。たとえば、再生専用ディスクと追記および再生が行えるディスク、再生専用ディスクと記録再生および消去が行えるディスク、追記および再生が行えるディスクと記録再生および消去が行えるディスク等任意の組み合わせに対しても適用可能である。勿論、２種類以上の異なる種類の光記録媒体を任意に組み合わせても適用可能である。

【００２６】

【発明の効果】本発明の光学ピックアップ装置によれば、小型且つ各々の受光部パターンが高精度な相対位置精度を有する光検出器の提供が可能であり、種類の異なる光記録媒体に対して高品質の再生信号や記録信号が得られるとともに小型の光学ピックアップ装置および光記録再生装置の提供が可能となる。

【図面の簡単な説明】

【図１】　本発明の実施の形態例１を示す、光学ピックアップ装置の概略構成図である。

【図２】　ＣＤを再生する場合の、図１におけるＡ方向から光検出器をみた概略平面図である。

【図３】　ＤＶＤ－ＲＯＭを再生する場合の、図１におけるＡ方向から光検出器をみた概略平面図である。

【図４】　本発明の実施の形態例１の他の事例を示す、光学ピックアップ装置の概略構成図である。

【図５】　図４におけるＢ方向から光検出器をみた概略平面図である。

【図６】　本発明の実施の形態例１のさらに他の事例を示す、光学ピックアップ装置の概略構成図である。

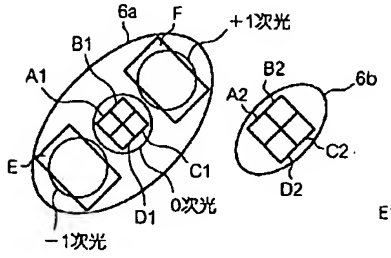
【図７】　本発明の実施の形態例２を示す、光学ピックアップ装置の概略構成図である。

【図８】　本発明の実施の形態例３を示す、光記録再生装置の概略ブロック図である。

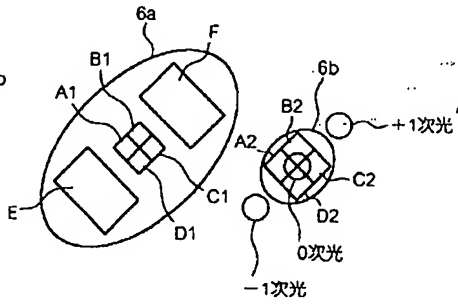
【符号の説明】

１…光源、１ａ…第１の光源、１ｂ…第２の光源、２…回折格子、３…ビームスプリッタ、４…コリメータレンズ、５…対物レンズ、６…光検出器、６ａ…第１の受光部パターン、６ｂ…第２の受光部パターン、７…光源合成用ビームスプリッタ、８…スピンドルモータ、９…スレッドモータ、１０…光学ピックアップ装置、１１…ＲＦＭＡＴＲＩＸアンプ、１２…サーボプロセッサ／再生データ復調部、１３…サーボドライバ、１４…スピンドルモータドライバ、１５…システムコントローラ

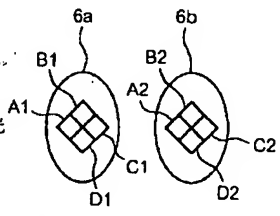
【図２】



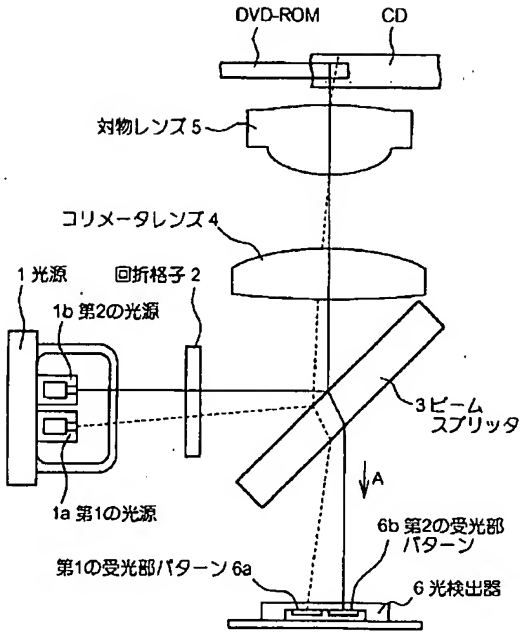
【図３】



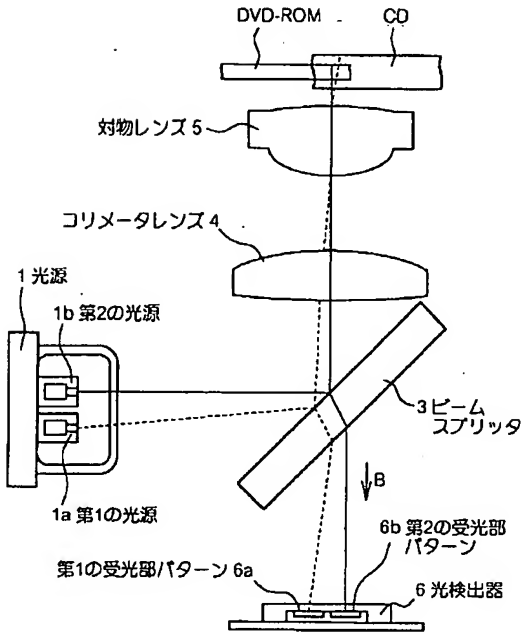
【図５】



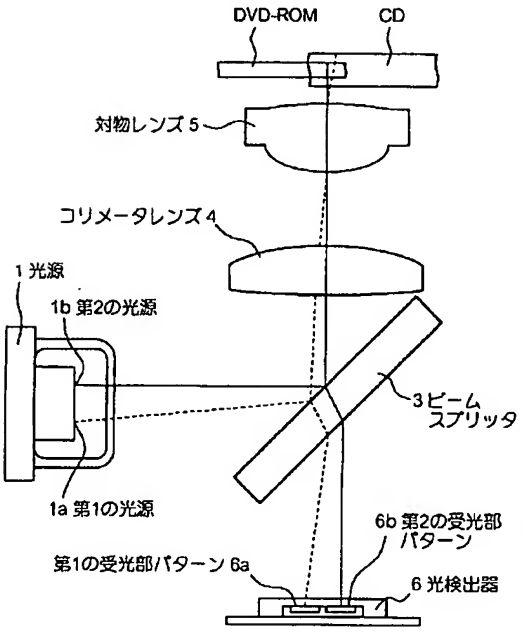
【図１】


DVD-ROM
CD
対物レンズ 5
コリメータレンズ 4
1 光源
回折格子 2
1b 第2の光源
3 ビーム スプリッタ
A
1a 第1の光源
6b 第2の受光部 パターン
第1の受光部パターン 6a
6 光検出器

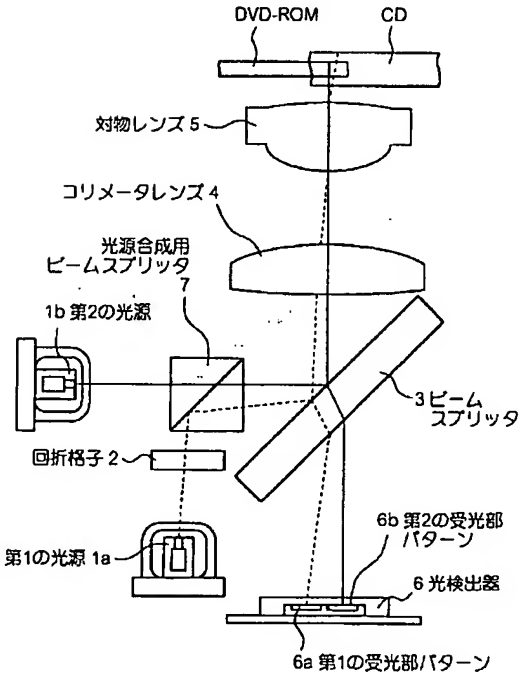
【図４】


DVD-ROM
CD
対物レンズ 5
コリメータレンズ 4
1 光源
1b 第2の光源
3 ビーム スプリッタ
B
1a 第1の光源
6b 第2の受光部 パターン
第1の受光部パターン 6a
6 光検出器

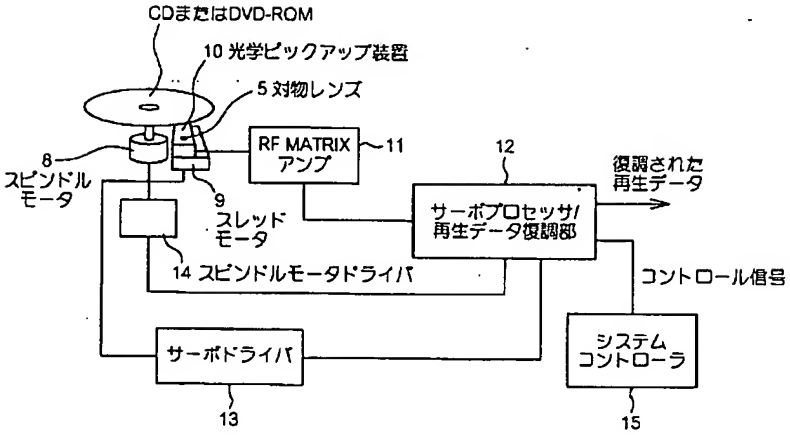
【図６】


DVD-ROM
CD
対物レンズ 5
コリメータレンズ 4
1 光源
1b 第2の光源
3 ビーム スプリッタ
1a 第1の光源
6b 第2の受光部 パターン
第1の受光部パターン 6a
6 光検出器

【図７】


DVD-ROM
CD
対物レンズ 5
コリメータレンズ 4
光源合成用 ビームスプリッタ 7
1b 第2の光源
3 ビーム スプリッタ
回折格子 2
第1の光源 1a
6b 第2の受光部 パターン
6 光検出器
6a 第1の受光部パターン

【図8】


CDまたはDVD-ROM
10 光学ピックアップ装置
5 対物レンズ
8
スピンドル
モータ
RF MATRIX
アンプ
11
12
復調された
再生データ
9
スレッド
モータ
サーボプロセッサ/
再生データ復調部
14 スピンドルモータドライバ
コントロール信号
サーボドライバ
システム
コントローラ
13
15

PATENT ABSTRACTS OF JAPAN

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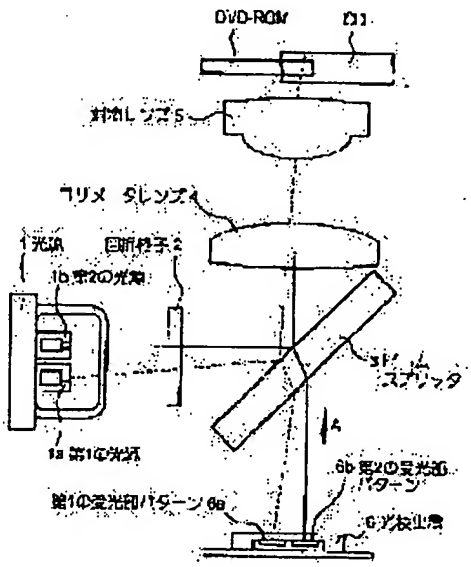
(71)Applicant : SONY CORP
(72)Inventor : MATSUMOTO YOSHIYUKI

(54) OPTICAL PICKUP DEVICE AND OPTICAL RECORDING AND REPRODUCING APPARATUS PROVIDED THEREWITH

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an optical pickup device and an optical recording and reproducing apparatus which obtain a high-quality reproducing signal and a high-quality recording signal with reference to different kinds of optical recording mediums and which are small.

SOLUTION: This optical pickup device is featured so as to be provided with a plurality of light sources (a first light source 1a and a second light source 1b) at different wavelengths. In addition, it is featured so as to be provided with a photodetector 6 in which a plurality of light-receiving-part patterns (a first light-receiving-part pattern 6a and a second light-receiving-part pattern 6b) used to receive reflected light beams from an optical recording medium (a CD or a DVD-ROM) by respective radiated light beams radiated from the plurality of light sources (the first and second light sources 1a, 1b) are formed on the same substrate. In addition, it is featured so as to be provided with an optical system (composed of a diffraction grating 2, a beam splitter 3, a collimating lens 4 and an objective lens 5) in which an optical path reaching the photodetector 6 from the plurality of light sources (the first and second light sources 1a, 1b) is owned jointly. This optical recording and reproducing apparatus is featured so as to be provided with it.



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[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
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3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The optical pickup which outgoing radiation is carried out from two or more light sources from which wavelength differs, and said two or more light sources, and is characterized by having the optical system which shares the optical path from said two or more light sources to the photodetector in which two or more light sensing portion patterns which receive each return light reflected with an optical recording medium according to an individual were formed on the same substrate, and said photodetector.
[Claim 2] The optical pickup according to claim 1 to which said two or more light sources are characterized by being arranged on the same substrate.
[Claim 3] Two or more light sources from which wavelength differs, and the photodetector in which two or more light sensing portion patterns which receive each return light which outgoing radiation is carried out from said two or more light sources, and is reflected with an optical recording medium according to an individual were formed on the same substrate, The optical recording regenerative apparatus characterized by having the optical pickup which has the optical system which shares the optical path from said two or more light sources to said photodetector, and the control driving means which carries out the control drive of the objective lens which constitutes said optical system in the direction of tracking of said optical recording medium at least.
[Claim 4] The optical recording regenerative apparatus according to claim 3 with which said two or more light sources are characterized by being arranged on the same substrate.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the optical recording regenerative apparatus which possesses in more detail the optical pickup and this corresponding to the optical recording medium with which classes differ about the optical recording regenerative apparatus possessing an optical pickup and this.
[0002]
[Description of the Prior Art] In DVD (Digital Video Disc or Digital Versatile Disc) which high density large capacity-ization in an optical recording technique was progressing greatly in recent years, for example, was commercialized recently to the pit size in CD (Compact Disc) having been about 0.83 micrometers, pit size is about 0.4 micrometers. Moreover, if it sees about a track pitch, as for DVD, narrow track pitch-ization is performed with 0.74 micrometers to CD having been 1.6 micrometers. The recording density in an optical recording technique is determined by the path of the optical spot converged through an objective lens, and this diameter of an optical spot is determined by the wavelength of the light source, and NA (Numerical Aperture) of an objective lens. That is, while minor diameter-ization of an optical spot is attained, it becomes possible to attain high density large capacity-ization more, so that the objective lens of Quantity NA is used more using the light source of short wavelength.
[0003] By the way, the organic-coloring-matter film which constitutes the record film of CD-R (CD which can be written in) is designed so that 70% or more of reflection factor equivalent to CD may be obtained only near the wavelength of 785nm of the light source. Therefore, it is the optical pickup which has the light source with a wavelength [of a piece] of 785nm, and it is possible to perform record playback to playback and CD-R of CD. However, a general optical pickup is difficult to have the light sources, such as semiconductor laser which carries out outgoing radiation of the optimal wavelength to the objective lens of NA with every [a piece / respectively optimal] to a specific optical recording medium, and to record information to the optical recording medium of other classes, or to reproduce the recorded information.
[0004] For example, although formation of the optical spot which the light source whose wavelength is 635nm or 650nm is required, and is converged on the record film of CD-R to DVD, using the light source of such wavelength is possible, the reflection factor in this wavelength range is bad, and it is difficult to obtain the reflected light which has sufficient reinforcement. That is, two or more light sources which carry out outgoing radiation of the light of the wavelength corresponding to each optical recording medium are required, and the photodetector which has a light sensing portion pattern corresponding to each optical recording medium is required of the optical pickup corresponding to the optical recording medium with which classes differ. In this case, high degree of accuracy was required of the relative-position precision of the light sensing portion pattern especially corresponding to each optical recording medium, high degree of accuracy was demanded also of the relative-position precision of two or more light sources which carry out outgoing radiation of the desirably different wavelength, and while satisfying these, the small optical pickup was called for. Moreover, the optical pickup

corresponding to the optical recording medium with which classes differ was provided, and the optical recording regenerative apparatus which can acquire the regenerative signal and record signal of high quality to small and each optical recording medium was called for.

[0005]

[Problem(s) to be Solved by the Invention] The technical problem of this invention is offering the optical recording regenerative apparatus possessing a small optical pickup and this small while the regenerative signal and record signal of high quality are acquired to the optical recording medium with which classes differ.

[0006]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, outgoing radiation is carried out from two or more light sources from which wavelength differs in the optical pickup of this invention, and two or more light sources, and it is characterized by having the optical system which shares the optical path from two or more light sources to the photodetector in which two or more light sensing portion patterns which receive each return light reflected with an optical recording medium according to an individual were formed on the same substrate, and a photodetector.

[0007] The photodetector in which two or more light sensing portion patterns which receive each return light which outgoing radiation is carried out in the optical recording regenerative apparatus of this invention from two or more light sources from which wavelength differs, and two or more light sources, and is reflected with an optical recording medium according to an individual were formed on the same substrate, The optical pickup which has the optical system which shares the optical path from two or more light sources to a photodetector, It is characterized by carrying out the control drive of the objective lens which constitutes optical system in the direction of tracking of an optical recording medium at least, for example, having the control driving means constituted by the linear motor etc.

[0008] The desirable embodiment in an above-mentioned optical pickup and an above-mentioned optical recording regenerative apparatus arranges two or more light sources from which wavelength differs on the same substrate.

[0009] About the operation by the means mentioned above, it describes below. By forming two or more light sensing portion patterns on the same substrate, offer of the small photodetector which has a highly precise relative-position precision of each light sensing portion pattern is attained, and offer of the small optical pickup corresponding to the optical recording medium with which classes differ using this of it is attained. And it becomes possible to lead each return light which outgoing radiation is carried out in the optical recording regenerative apparatus possessing this optical pickup from two or more light sources from which wavelength differs, and is reflected with an optical recording medium with high precision to a light sensing portion pattern, and while it is possible to acquire the regenerative signal and record signal of high quality to the optical recording medium with which classes differ, it becomes possible to attain a miniaturization.

[0010]

[Embodiment of the Invention] This invention is applicable to the optical recording regenerative apparatus possessing the optical pickup and this corresponding to the optical recording medium with which the classes together put variously with DVD-RAM which can perform DVD-R, record playback, and elimination which can perform the optical disk, the postscript, and playback only for the playbacks represented by CD, DVD-ROM, etc., a magneto-optic disk, etc. differ. In addition, an optical pickup here and an optical recording regenerative apparatus contain the reproduced playback dedicated device, the record dedicated device which performs only record, and the equipment which can perform both record and playback. Hereafter, the example of a gestalt of operation of this invention is explained with reference to drawing 1 - drawing 8 .

[0011] As the example of a gestalt of the one example operation of a gestalt of operation was shown in the outline block diagram of the optical pickup of drawing 1 It is the example of the optical pickup corresponding to CD and DVD-ROM as an example of two kinds of different

optical recording media. The light source 1 has contained light source 1of ** 2nd with a wavelength of 655nm b in the same package corresponding to 1st light source 1a and DVD-ROM with a wavelength of 785nm, for example [corresponding to CD arranged by having predetermined spacing on the same substrate]. Moreover, the photodetector 6 has contained 1st light sensing portion pattern 6a corresponding to CD formed by having predetermined spacing on the same substrate, and 2nd light sensing portion pattern 6b corresponding to DVD-ROM in the same package, as shown in drawing 2 which is the outline top view which saw the photodetector 6 from A in drawing 1 .

[0012] First, the case where CD is played is explained. When reproducing the information currently recorded on CD, in case the outgoing radiation light from the 1st light source 1a penetrates a diffraction grating 2, it separates into the three flux of lights (zero-order light, +primary light, -primary light) from which a travelling direction differs mutually, and incidence of it is carried out to the beam splitter 3 which consisted of transparent parallel plates. Incidence of the zero-order light reflected by the beam splitter 3, +primary light, and the -primary light is carried out to a collimator lens 4, and all are changed into parallel light. It converges according to an individual through an objective lens 5, and the zero-order light which penetrated the collimator lens 4, +primary light, and -primary light form three optical spots in the information recording surface of CD in this case. The return light of the zero-order light reflected by the signal recording surface of CD, +primary light, and -primary light penetrates an objective lens 5, a collimator lens 4, and a beam splitter 3 again, and they carry out incidence to 1st light sensing portion pattern 6a of a photodetector 6. In the example shown in drawing 2 , a focusing error signal is detected by the signal outputs IA1, IB1, IC1, and ID1 obtained from the light sensing portion patterns A1, B1, C1, and D1 of the quadrisection which receives the return light of the zero-order light reflected by the signal recording surface of CD based on the operation of (-(IB1+ID1)). [(IA1+IC1)] Moreover, tracking error signals are the signal outputs IE and IF obtained from the light sensing portion pattern F which receives the return light of the E and primary [+] light sensing portion pattern light which receives the return light of -primary light. It is detected based on the operation of (IE-IF). Moreover, a RF signal is detected based on the operation of (IA1+IB1+IC1+ID1).

[0013] In addition, the objective lens 5 of the specification corresponding to [generally] DVD-ROM in the objective lens 5 shared by playback with CD and DVD-ROM in this way is adopted. If CD is played using the objective lens 5 of a DVD-ROM specification, since an optical spot will be expanded according to the spherical aberration of an objective lens 5 more than a light-receiving field, while the effectual numerical aperture NA becomes smallness, effective aberration also decreases. That is, since the light-receiving field in CD and DVD-ROM is separated, it enables this texture **** and to play CD in the pattern configuration of 1st light sensing portion pattern 6a for CD so that it may become the proper efficiency NA.

[0014] Below, the case where DVD-ROM is reproduced is explained. When reproducing the information currently recorded on DVD-ROM, outgoing radiation of the outgoing radiation light is carried out from the 2nd light source 1b. The process until the return light in which the outgoing radiation light from the 2nd light source 1b reached the signal recording surface of DVD-ROM, and was hereafter reflected by the signal recording surface of DVD-ROM penetrates a beam splitter 3 is the same as that of the case of the above-mentioned CD. And the return light which penetrated the beam splitter 3 is led to 2nd light sensing portion pattern 6b of a photodetector 6. Drawing 3 is the outline top view which saw the photodetector 6 from A in drawing 1 like drawing 2 . In the example shown in drawing 3 , a focusing error signal is detected by the signal outputs IA2, IB2, IC2, and ID2 obtained from the light sensing portion pattern A2 of the quadrisection which receives the return light of the zero-order light reflected by the signal recording surface of DVD-ROM, B-2, and C2 and D2 based on the operation of (- (IB2+ID2)). [(IA2+IC2)] Moreover, a tracking error signal is detected based on the operation by DPD (Differential Phase Detection: the phase contrast detecting method) (phase (IA2+IC2)-phase (IB2+ID2)). Moreover, a RF signal is detected based on the operation of (IA2+IB2+IC2+ID2). That

is, it is separated by the diffraction grating 2 and the +primary light and -primary light which were reflected by the signal recording surface of DVD-ROM ignore.

[0015] Although above-mentioned drawing 1 showed the example which arranged the diffraction grating 2 into the optical path between the light source 1 and a beam splitter 3, it is good also as a configuration which removes a diffraction grating 2 and acquires a tracking error signal for each of CDs and DVD-ROMs by the DPD method as shown in the outline block diagram of an optical pickup shown in drawing 4 . As the 1st of the photodetector 6 in this case and the light sensing portion patterns 6a and 6b of 2 were shown in drawing 5 which is the outline top view which saw the photodetector 6 from B in drawing 4 , all serve as a light sensing portion pattern (for 1st light sensing portion pattern 6a for CD, 2nd light sensing portion pattern 6b A1, B1, C1, D1, and for DVD-ROM is A2, B-2, and C2 and D2) of quadrisection.

[0016] Moreover, it is good also as the so-called multi-luminescence light source which constituted the 1st and 2 light sources 1a and 1b constituted by the light source 1 in the same semi-conductor substrate as shown in the outline block diagram of an optical pickup shown in drawing 6 . Thus, if the 1st and 2 light sources 1a and 1b are constituted in the same semi-conductor substrate, spacing of 1st light source 1a and 2nd light source 1b can be positioned with high degree of accuracy. That is, outgoing radiation is carried out from this light source 1, and it becomes possible to lead the return light reflected with the optical recording medium with high precision to 1st light sensing portion pattern 6a of a photodetector 6, or 2nd light sensing portion pattern 6b. Thus, the light source 1 constituted in the same semi-conductor substrate can apply the 1st and 2 light sources 1a and 1b also to the example naturally shown in drawing 1 .

[0017] As the example of a gestalt of the two example operation of a gestalt of operation was shown in the outline block diagram of the optical pickup of drawing 7 , it is the example of the optical pickup corresponding to CD and DVD-ROM as an example of two kinds of different optical recording media, and the light sources 1 are light source 1of ** 1st with a wavelength of 785nm a, and the example which arranged separately light source 1of ** 2nd with a wavelength of 655nm b corresponding to DVD-ROM, for example [corresponding to CD]. In addition, the photodetector 6 has contained 1st light sensing portion pattern 6a corresponding to CD formed by having predetermined spacing on the same substrate, and 2nd light sensing portion pattern 6b corresponding to DVD-ROM in the same package like drawing 2 which is the outline top view which saw the photodetector 6 from A in drawing 1 .

[0018] First, the case where CD is played is explained. When reproducing the information currently recorded on CD, in case the outgoing radiation light from the 1st light source 1a penetrates a diffraction grating 2, incidence of it is carried out to the beam splitter 3 which was divided into the three flux of lights (zero-order light, +primary light, -primary light) from which a travelling direction differs mutually, was reflected by the beam splitter 7 for light source composition, and consisted of transparent parallel plates. In the example 1 of a gestalt of operation, with reference to drawing 1 and drawing 2 , the following is the same as that of explanation, and omits the overlapping explanation.

[0019] Below, the case where DVD-ROM is reproduced is explained. When reproducing the information currently recorded on DVD-ROM, the outgoing radiation light from the 2nd light source 1b penetrates the beam splitter 7 for light source composition. Hereafter, it is the same as that of the explanation which referred to drawing 1 and drawing 3 in the example 1 of a gestalt of operation, and the overlapping explanation is omitted.

[0020] It is good also as a configuration which removes the diffraction grating 2 arranged into the optical path between 1st light source 1a and the beam splitter 7 for light source composition like the example 1 of a gestalt of operation, and acquires a tracking error signal for each of CDs and DVD-ROMs by the DPD method also in the example of a gestalt of this operation. The 1st of the photodetector 6 in this case and the light sensing portion patterns 6a and 6b of 2 all turn into a light sensing portion pattern (for 1st light sensing portion pattern 6a for CD, 2nd light sensing portion pattern 6b A1, B1, C1, D1, and for DVD-ROM is A2, B-2, and

C2 and D2) of quadrisection like drawing 5 referred to in the example 1 of a gestalt of operation.

[0021] The example of a gestalt of the three example operation of a gestalt of operation explains an example possessing the optical pickup shown in the above-mentioned examples 1 and 2 of a gestalt of operation of the outline configuration of an optical recording regenerative apparatus with reference to drawing 8 which is an outline block diagram. the spindle motor 8 which constitutes the optical recording regenerative apparatus of the example of a gestalt of this operation -- both CD and DVD-ROM -- although -- the chucking equipment in which chucking is possible is constituted. Moreover, the guide device in which the thread motor 9 and illustration are omitted is constituted so that the optical pickup 10 may be moved in the direction of tracking. In this case, it is good also as a configuration which makes the objective lens 5 which constitutes the optical pickup 10 at least a configuration movable in the direction of tracking, and arranges other optics except an objective lens 5 in a fixed side.
[0022] Control of the whole optical recording regenerative apparatus is performed through a servo processor / playback data recovery section 12 based on the command from a system controller 15. While the light source corresponding to each in CD or DVD-ROM by which chucking was carried out to the spindle motor 8 is chosen, the feed rate by the thread motor 9 etc. is chosen, and the regenerative signal by the optical pickup 10 is supplied to the RFMATRIX amplifier 11. The signal which generation of playback data was performed and was amplified from detection of the positional information of where [of a focusing error signal, a tracking error signal, CD, or DVD-ROM] to have read in this RFMATRIX amplifier 11 etc. and a RF signal is supplied to a servo processor / playback data recovery section 12. The playback data recovery section constituted by this servo processor / playback data recovery section 12 is constituted possible [a recovery] in each of CDs and DVD-ROMs.
[0023] The focusing error signal and tracking error signal of these are filtered, and are supplied to the servo driver 13 as a focusing control signal and a tracking control signal. For example, the servo driver 13 constitutes the optical pickup 10 with a focusing control signal, the focusing coil of a 2 shaft actuator is driven and it drives the tracking coil of the 2 shaft actuator which constitutes the optical pickup 10 with a tracking control signal. The low-pass component of a tracking control signal is supplied to the servo driver 13, and drives the thread motor 9. The feedback servo of a focusing servo, a tracking servo, and a thread servo is performed by these.
[0024] The positional information of where [of CD or DVD-ROM] to have read is processed by a servo processor / playback data recovery section 12, spindle Motor Driver 14 is supplied as a spindle control signal, the control drive of the spindle motor 8 is carried out at the predetermined rotational frequency according to the location where CD by which chucking was carried out to the spindle motor 8, or DVD-ROM is reproduced, and actual playback is started from here. And the playback data to which it was processed by a servo processor / playback data recovery section 12, and restored are supplied outside.
[0025] In the example shown in the examples 1 and 2 of a gestalt of the above-mentioned operation, as an example of the optical recording medium with which classes differ, although the optical pickup corresponding to two kinds of CDs and DVD-ROM was shown and the example 3 of a gestalt of operation showed the optical recording regenerative apparatus possessing the optical pickup of the example shown in the examples 1 and 2 of a gestalt of operation, this invention is not limited to this. For example, it is applicable also to the combination of arbitration, such as a disk which can perform the disk, record playback, and elimination which can perform the disk and postscript which can perform the disk which can perform the disk only for playbacks, postscript, and playback, the disk only for playbacks, record playback, and elimination, and playback. Of course, it is applicable even if it combines the optical recording medium of two or more kinds of different classes with arbitration.
[0026]
[Effect of the Invention] According to the optical pickup of this invention, while offer of the photodetector with which small and each light sensing portion pattern have a highly precise

relative-position precision is possible and the regenerative signal and record signal of high quality are acquired to the optical recording medium with which classes differ, offer of a small optical pickup and an optical recording regenerative apparatus is attained.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline block diagram of an optical pickup showing the example 1 of a gestalt of operation of this invention.
[Drawing 2] It is the outline top view which saw the photodetector from A in drawing 1 in the case of playing CD.
[Drawing 3] It is the outline top view which saw the photodetector from A in drawing 1 in the case of reproducing DVD-ROM.
[Drawing 4] It is the outline block diagram of an optical pickup showing other examples of the example 1 of a gestalt of operation of this invention.
[Drawing 5] It is the outline top view which saw the photodetector from B in drawing 4 .
[Drawing 6] It is the outline block diagram of an optical pickup showing the example of further others of the example 1 of a gestalt of operation of this invention.
[Drawing 7] It is the outline block diagram of an optical pickup showing the example 2 of a gestalt of operation of this invention.
[Drawing 8] It is the outline block diagram of the optical recording regenerative apparatus in which the example 3 of a gestalt of operation of this invention is shown.
[Description of Notations]
1 [— A diffraction grating, 3 / — Beam splitter,] — The light source, 1a — The 1st light source, 1b — The 2nd light source, 2 4 [— The 1st light sensing portion pattern,] — A collimator lens, 5 — An objective lens, 6 — A photodetector, 6a 6b — The 2nd light sensing portion pattern, 7 — The beam splitter for light source composition, 8 — Spindle motor, 9 [— A servo processor / playback data recovery section, 13 / — A servo driver, 14 / — Spindle Motor Driver, 15 / — System controller] — A thread motor, 10 — An optical pickup, 11 — RFMATRIX amplifier, 12

[Translation done.]

* NOTICES *

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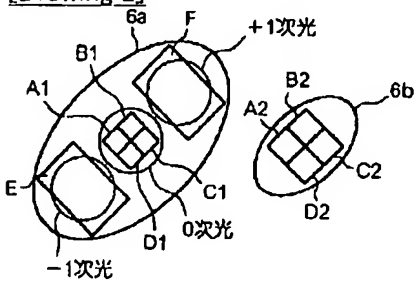
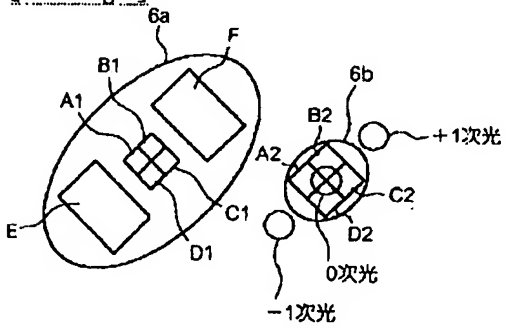
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

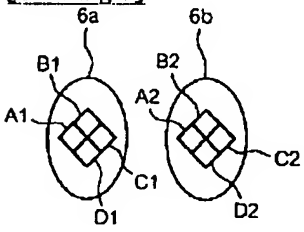
[Drawing 2]



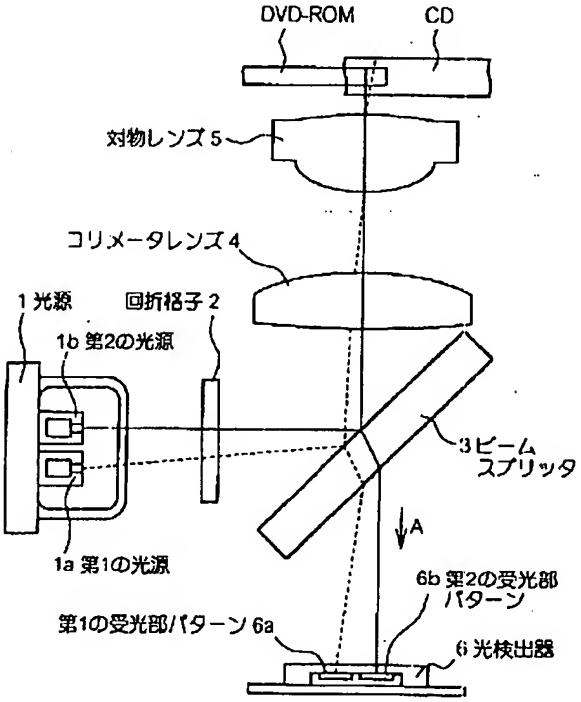
[Drawing 3]



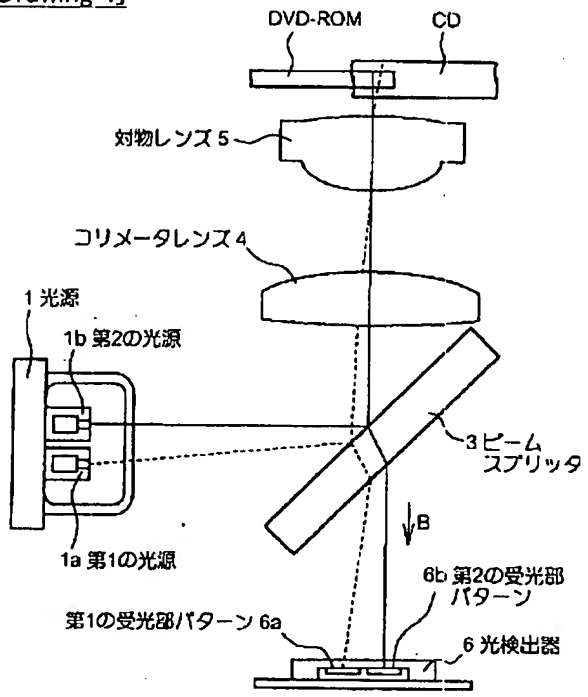
[Drawing 5]



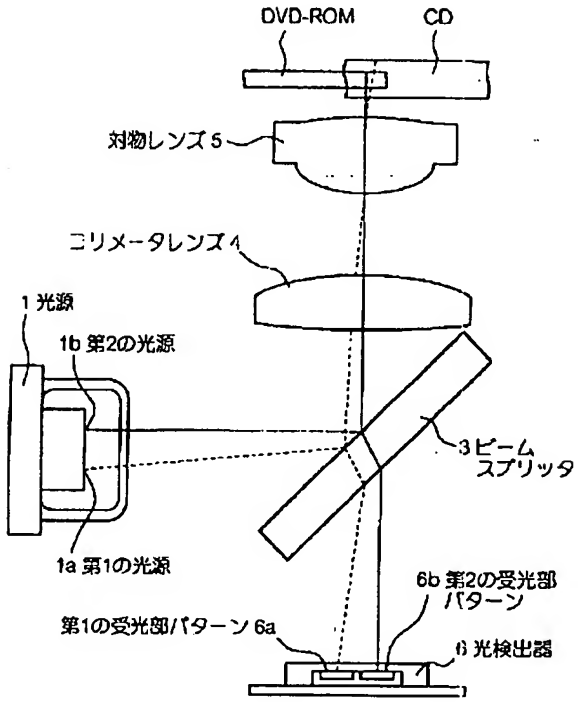
[Drawing 1]



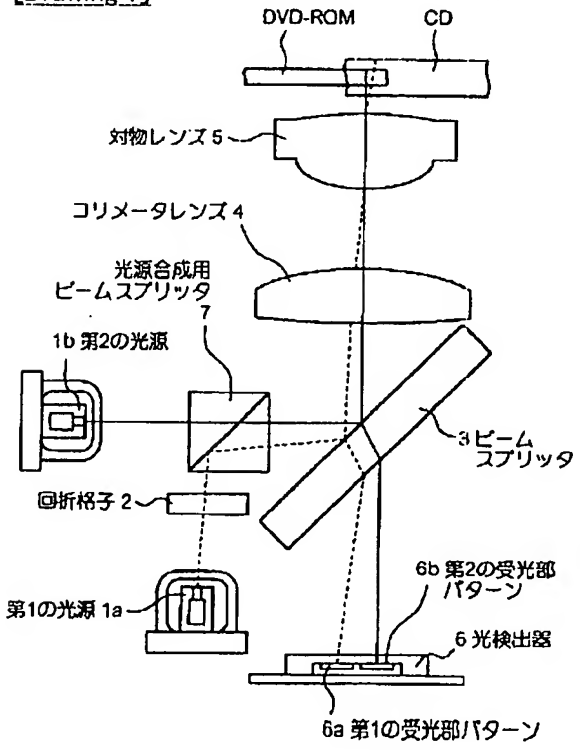
[Drawing 4]



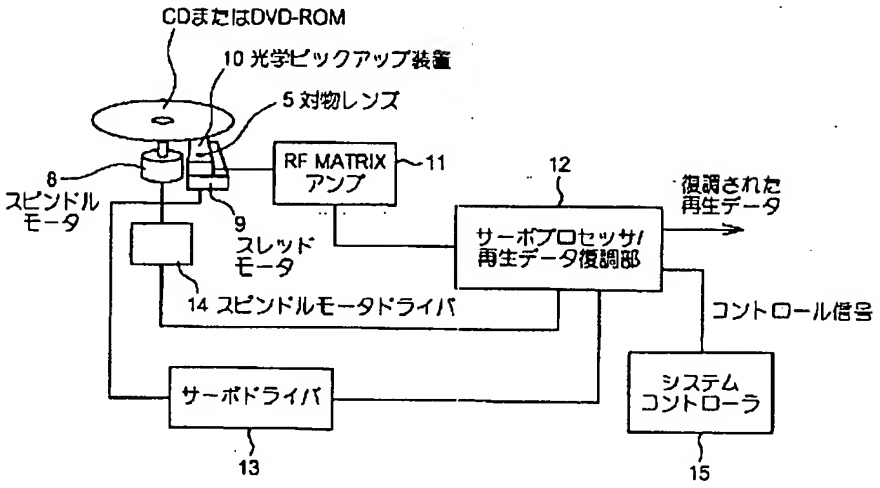
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]

* NOTICES *

CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
[Section partition] The 4th partition of the 6th section
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[Procedure revision]
[Filing Date] December 22, Heisei 17 (2005. 12.22)
[Procedure amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[The contents of amendment]
[Claim(s)]
[Claim 1]
Two or more light sources which carry out outgoing radiation of the light which differs in wavelength, respectively,
The photodetector in which two or more light sensing portion patterns which receive each return light which outgoing radiation is carried out from said two or more light sources, and is reflected with an optical recording medium according to an individual were formed on the same substrate,
The optical pickup characterized by having the optical system which shares the optical path which results in said photodetector of the light by which outgoing radiation is carried out from said two or more light sources, respectively.
[Claim 2]
The optical pickup according to claim 1 to which said two or more light sources are characterized by being arranged on the same substrate.
[Claim 3]
Said optical system is an optical pickup according to claim 1 characterized by having the beam splitter which separates the light and the return light from an optical recording medium by which outgoing radiation was carried out from said two or more light sources, and the convergence

component which turns to an optical recording medium the light by which outgoing radiation was carried out, and is converged from said two or more light sources.
[Claim 4]
Said optical system is an optical pickup according to claim 3 characterized by having the diffraction grating which trichotomizes the light by which outgoing radiation was further carried out from one of said two or more of the light sources.
[Claim 5]
The optical pickup according to claim 3 characterized by providing the following. Said two or more light sources are the 1st light source which carries out outgoing radiation of the light of the 1st wavelength. The optical element which turns to said optical system the optical path of the light by which outgoing radiation was carried out from the optical path and said 2nd light source of the light by which the 2nd light source which carries out outgoing radiation of the light of the 2nd wavelength shorter than said 1st wavelength estranged, and has been arranged, and outgoing radiation was carried out from said 1st light source
[Claim 6]
Said two or more light sources are optical pickups according to claim 1 characterized by consisting of the 1st light source which carries out outgoing radiation of the light of the 1st wavelength, and the 2nd light source which carries out outgoing radiation of the light of the 2nd wavelength shorter than said 1st wavelength, and using alternatively said 1st or 2nd light source according to the class of optical recording medium.
[Claim 7]
Said two or more attendance patterns are optical pickups according to claim 6 characterized by preparing the 1st light-receiving pattern section which receives the return light which outgoing radiation was carried out from said 1st light source, and was reflected by the optical recording medium, and the 2nd light-receiving pattern section which receives the return light which outgoing radiation was carried out from said 2nd light source, and was reflected by the optical recording medium on the same substrate.
[Claim 8]
The light by which reached, respectively and outgoing radiation was carried out from said two or more light sources is an optical pickup according to claim 1 characterized by the optical axis not being completely in agreement in the optical path which progresses said optical system.
[Claim 9]
Two or more light sources which carry out outgoing radiation of the light which differs in wavelength, respectively,
The photodetector in which two or more light sensing portion patterns which receive each return light which outgoing radiation is carried out from said two or more light sources, and is reflected with an optical recording medium according to an individual were formed on the same substrate,
The optical pickup characterized by having the optical system which shares the optical path which results in said photodetector of the light by which outgoing radiation is carried out from said two or more light sources, respectively,
The control driving means which carries out the control drive of the objective lens which constitutes said optical system in the direction of tracking of said optical recording medium at least
The optical recording regenerative apparatus characterized by ****(ing).
[Claim 10]
The optical recording regenerative apparatus according to claim 9 with which said two or more light sources are characterized by being arranged on the same substrate.
[Claim 11]
Said optical system is an optical recording regenerative apparatus according to claim 9 characterized by having the beam splitter which separates the light and the return light from an optical recording medium by which outgoing radiation was carried out from said two or more

light sources, and the convergence component which turns to an optical recording medium the light by which outgoing radiation was carried out, and is converged from said two or more light sources.
[Claim 12]
Said optical system is an optical recording regenerative apparatus according to claim 11 characterized by having the diffraction grating which trichotomizes the light by which outgoing radiation was further carried out from one of said two or more of the light sources.
[Claim 13]
The optical recording regenerative apparatus according to claim 11 characterized by providing the following. Said two or more light sources are the 1st light source which carries out outgoing radiation of the light of the 1st wavelength. The optical element which turns to said optical system the optical path of the light by which outgoing radiation was carried out from the optical path and said 2nd light source of the light by which the 2nd light source which carries out outgoing radiation of the light of the 2nd wavelength shorter than said 1st wavelength estranged, and has been arranged, and outgoing radiation was carried out from said 1st light source
[Claim 14]
Said two or more light sources are optical recording regenerative apparatus according to claim 9 characterized by consisting of the 1st light source which carries out outgoing radiation of the light of the 1st wavelength, and the 2nd light source which carries out outgoing radiation of the light of the 2nd wavelength shorter than said 1st wavelength, and using alternatively said 1st or 2nd light source according to the class of optical recording medium.
[Claim 15]
Said two or more attendance patterns are optical recording regenerative apparatus according to claim 14 characterized by preparing the 1st light-receiving pattern section which receives the return light which outgoing radiation was carried out from said 1st light source, and was reflected by the optical recording medium, and the 2nd light-receiving pattern section which receives the return light which outgoing radiation was carried out from said 2nd light source, and was reflected by the optical recording medium on the same substrate.
[Claim 16]
The light by which reached, respectively and outgoing radiation was carried out from said two or more light sources is an optical recording regenerative apparatus according to claim 9 characterized by the optical axis not being completely in agreement in the optical path which progresses said optical system.
[Procedure amendment 2]
[Document to be Amended] Specification
[Item(s) to be Amended] 0006
[Method of Amendment] Modification
[The contents of amendment]
[0006]
[Means for Solving the Problem]
The outgoing radiation of the optical pickup which starts this invention in order to solve the above-mentioned technical problem is carried out from two or more light sources which carry out outgoing radiation of the light which differs in wavelength, respectively, and two or more of said light sources, and it makes have the photodetector in which two or more light sensing portion patterns which receive each return light reflected with an optical recording medium according to an individual were formed on the same substrate, and the optical system which shares the optical path which results in said photodetector of the light by which outgoing radiation is carried out from two or more of said light sources, respectively.
[Procedure amendment 3]
[Document to be Amended] Specification
[Item(s) to be Amended] 0007

[Method of Amendment] Modification
[The contents of amendment]
[0007]
Moreover, it is characterized by equipping the optical recording regenerative apparatus concerning this invention with the following. Two or more light sources which carry out outgoing radiation of the light which differs in wavelength, respectively The photodetector in which two or more light sensing portion patterns which receive each return light which outgoing radiation is carried out from said two or more light sources, and is reflected with an optical recording medium according to an individual were formed on the same substrate The optical pickup characterized by having the optical system which shares the optical path which results in said photodetector of the light by which outgoing radiation is carried out from said two or more light sources, respectively The control driving means constituted by the linear motor etc. by carrying out a control drive in the direction of tracking of said optical recording medium at least in the objective lens which constitutes said optical system

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[Translation done.]